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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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ORGANIZATIONAL
MAINTENANCE MANUAL

AUDIO OSCILLATORS TS-312/FSM-1, TS-312A/FSM-1, AND TS-382/U, AND SIGNAL GENERATOR TS-312B/FSM-1

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HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1967

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WARNING

Be careful when working on the 115-volt connections and the +240- and +340-volt circuits. Serious injury or death may result from contact with these terminals.

DO NOT TAKE CHANCES!

TECHNICAL MANUAL
No. 11-6625-935-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *6 July 1967*

Organizational Maintenance Manual
AUDIO OSCILLATORS TS-312/FSM-1, TS-312A/FSM-1, AND TS-382/U, AND SIGNAL GENERATOR TS-312B/FSM-1

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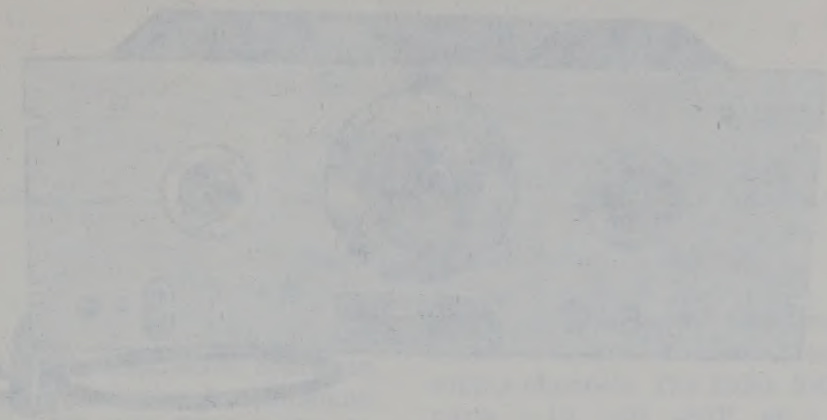

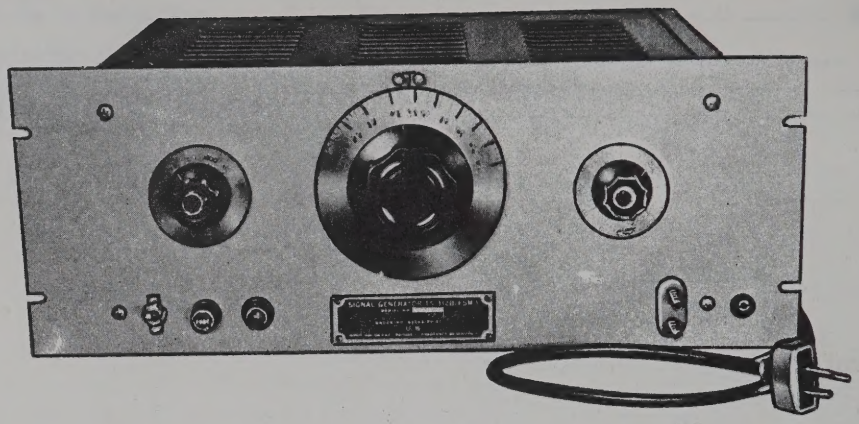

TM 6625-270-12-1

Figure 1. Signal Generator TS-312B/FSM-1.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual covers installation, operation, and operator's and organizational maintenance of Signal Generator TS-312B/FSM-1 (fig. 1), Audio Oscillator TS-312/FSM-1 (fig. 2), Audio Oscillator TS-382/U (fig. 3), and Audio Oscillator TS-312A/FSM-1. Audio Oscillators TS-312A/FSM-1 and those TS-312/FSM-1's, procured on Order No. 38785-P-53, are similar in appearance to the model illustrated in figure 1. This manual includes operation under usual conditions, cleaning and inspection of the equipment, and replacement of parts available to operator and organizational maintenance.

b. The term *signal generator* will be used throughout the remainder of this manual to refer to Signal Generator TS-213B/FSM-1, and Audio Oscillators TS-312/FSM-1, TS-312A/ FSM-1 and TS-382/U.

2. Index of Publications

Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment. DA Pam 310-4 is an index of current technical manuals, technical bulletins, supply manuals (types 7, 8, and 9) supply bulletins, lubrication orders, and modification work orders that are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.) and the latest changes to and revisions of each equipment publication.

3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army) NAVSUP Publication 378 (Navy), and AFR 71-4 (Air Force).

c. Reporting of Equipment Manual Improvements. Report of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MR-NMP-AD, Fort Monmouth, N.J. 07703.

Section II. DESCRIPTION AND DATA

4. Purpose and Use

Signal Generator TS-312B/FSM-1 and Audio Oscillators TS-312/FSM-1, TS-312A/ FSM-1, and TS-382/U may be used wherever a low-power test signal ranging between 20 and 200,000 cycles per second (cps) is needed. Specifically, the equipment is useful for the following:

a. Testing voltage gain in wide-band audio amplifiers.

b. Obtaining distortion and frequency response curves in wide-band audio amplifiers.

c. Modulating radiofrequency oscillators.

d. Checking equipment, such as radar trainers, operating at supersonic frequencies.

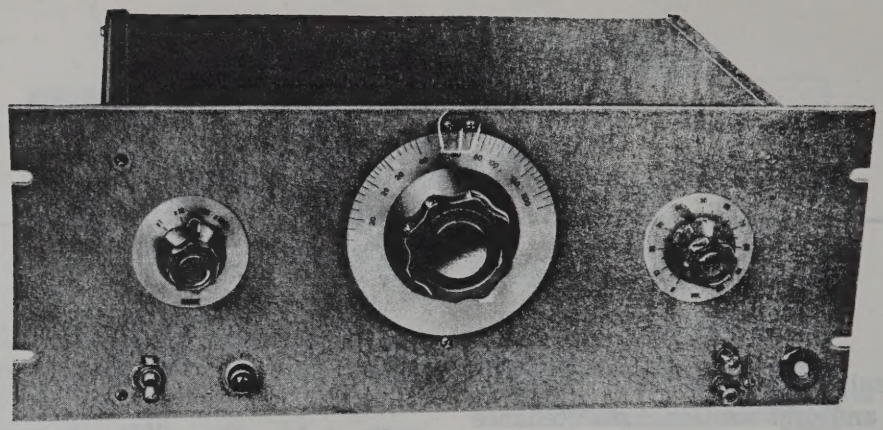

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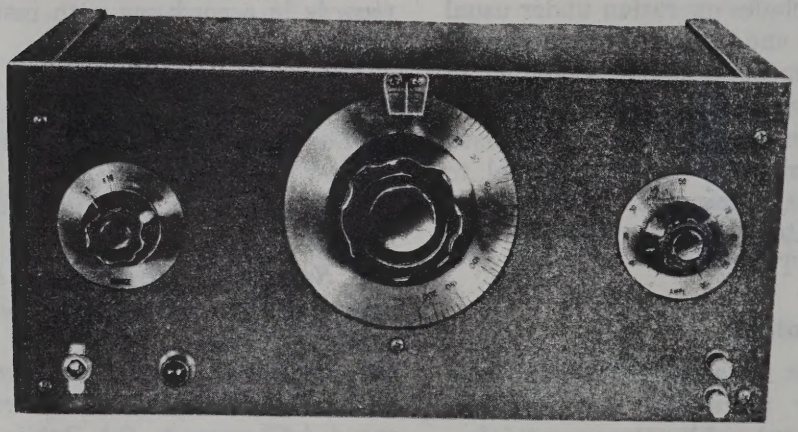
Figure 2. Audio Oscillator TS–312/FSM–1, less running spares and technical manuals.



TM6625–270–12–3

Figure 3. Audio Oscillator TS–382/U, less running spares and technical manuals.

5. Technical Characteristics

Frequency range	20 to 200,000 cps.
Calibration of tuning dial.	20 to 200.
Bands:	
X1	20 to 200 cps.
X10	200 to 2,000 cps.
X100	2,000 to 20,000 cps.
X1000	20,000 to 200,000 cps.
Output impedance	1,000 ohm (grounded).
Frequency response	Flat within ±2% under normal temperature conditions.
Distortion	Less than 1% from 20 to 20,000 cps, at rated output.
Hum	60 decibels below rated output.

Power input	110 to 120 volts, 60 cycles, 68 watts alternating current (50 to 1,000 cycles alternating current on TS-312B/FSM-1).
Power output	100 milliwatts into 1,000-ohm load.
Fuse rating	1 ampere (2 amperes on TS-312B/FSM-1).
Number of tubes	5.
Weight	62 pounds.

6. Components

The major component (fig. 1, 2, and 3) and the running spares (fig. 4) of the signal generator are listed in appendix B.

Figure 4. Running spares.

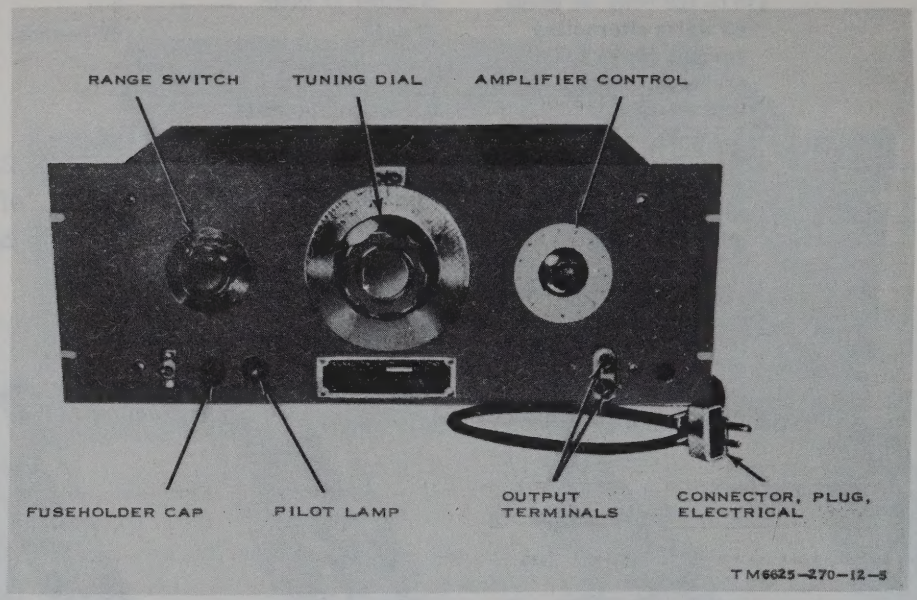


Figure 5. Signal generator controls and indicator.

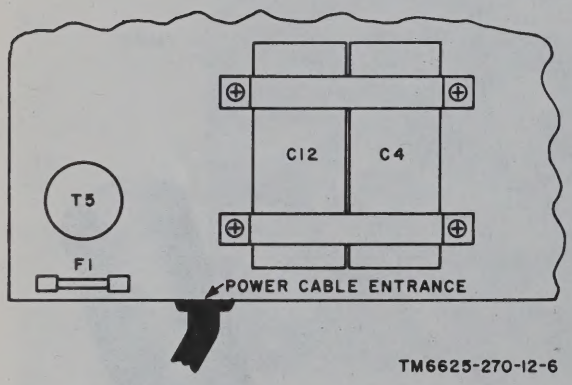


Figure 6. Audio Oscillators TS–312/FSM–1 and TS–382/U, fuse location diagram.

7. Description
(fig. 5)

The output frequency of the signal generator is determined by the tuning dial in the center of the panel and the RANGE switch on the left-hand side. The dial is calibrated from 20 to 200, but this setting must be multiplied by the factor determined by the RANGE switch (X1, X10, X100, or X1000) to obtain the actual frequency. The amplitude of the output may be varied by the AMPL. control on the right-hand side of the panel. An ON-OFF switch, a pilot lamp, a fuse, and a pair of output terminals are also provided. Louvers in the top and back of the cover supply necessary ventilation.

8. Differences in Models

Audio Oscillators TS–382/U, TS–312/FSM–1, and TS–312A/FSM–1, and Signal Generator TS–312B/FSM–1 are similar electrically. They have different nomenclature because the former are designed for bench use, while the latter may be rock-mounted as a component of Frequency Measuring Assembly CY–93/FSM–1. The following chart lists the differences in models:

Model	Case	Fuse F1, location	Fuse F1, ampere rating	Tube reference symbols a	Tube location diagram	3-watt lamp designation b	Tube type, V5	Pilot lamp designation c
Audio Oscallator TS–382/U.	Designed for bench use	Inside bottom of chassis, rear left–hand corner, next to power cable entrance (fig. 6).	1	T1, T2, T3, T4, and T5.	Fig. 9	R11	5Y3WGT	None
Audio Oscillator TS–312/FSM–1.	Rack-mounted long front panel with four slots.	Same as above	1	Same as above.	Fig. 9	R11	5Y3WGT	None
Audio Oscillator TS–312/FSM–1 (Order No. 38785–P–53).	Rack-mounted long front panel with four holes.	Front panel (fig. 5)	1	V1, V2, V3, V4, and V5.	Fig. 9	I2	5Y3WGT	I1
Audio Oscillator TS–312A/FSM–1.	Rack-mounted long front panel with four slots.	Front panel (fig. 5)	1	Same as above.	Fig. 9	I2	5Y3WGT or 5Z4.	I1
Signal Generator TS–312B/FSM–1.	Same as above	Front panel (fig. 5)	2	Same as above.	Fig. 8	RT1	5Z4	DS1

a This manual used V1, V2, V3, V4, and V5 to refer to the vacuum tubes in text. Audio Oscillators TS–312/FSM–1 and TS–382/U use T1, T2, T3, T4, and T5 marked on the equipment to refer to the same tubes respectively.

b The 3-watt lamp is refered to as RT1 in this manual. Audio Oscillators TS–312/FSM–1 and TS–382/U use R11 marked on the equipment to refer to the same lamp. Audio Oscillators TS–312/FSM–1 (Order No. 38785–P–53) and TS–312A/FSM–1 use I2 to refer to this lamp.

c The pilot lamp is marked on the equipment as shown in the above chart. This manual will use DS1 to refer to the pilot lamp.

CHAPTER 2

OPERATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

9. Unpacking

a. Packaging Data. When packaged for shipment, each signal generator is packaged in a water-resistant fiberboard carton with all joints and seams sealed with water-resistant, pressure-sensitive tape. For further protection, the packaged signal generators are each packed in a nailed wooden box. A typical shipping box and its contents are shown in figure 7. The dimensions of the box are as follows: size 22 by 13 by 9 inches; volume, 1.5 cubic feet. The packed weight is 95 pounds.

b. Removing Contents.

(1) Be careful when unpacking the equipment. Do not thrust tools into the interior of an container or wrap. Select a site close to the base of operation that is free from dust, dirt, and excessive moisture.

(2) Cut and fold back the steel straps just below the box cover.

(3) Remove the nails from the top, one side, and one end; use a nailpuller. Do not attempt to pry off; prying may damage the equipment.

(4) Remove the envelope that contains the technical manuals and spare parts.

(5) Open the fiberboard box, remove the flat pads, and then remove the signal generator.

c. Component Dimensions.

Component	Overall dimensions (in.)			Volume (cu ft)	Weight (lb)
	Height	Width	Depth		
Signal Generator TS-312B/FSM-1 and Audio Oscillators TS-382/U, TS-312/FSM-1, and TS-312A/FSM-1.	7	15-3/4	10-5/8	2.48	62

Note. All models except the TS-382/U have a 19-inch panel which extends beyond the sides of the cabinet.

10. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, refer to paragraph 3.

b. Check the equipment against the packing list. When no packing list accompanies the equipment, use the basic issue items list (appx B) as a general check, and report any changes or shortages on DD Form 6 (para 3*b*).

11. Installation

a. Thoroughly inspect the exterior of the signal generator for damage incurred during shipment.

b. Loosen the two screws on the top of both sides of the unit. Remove the four Phillips-head screws at the back of the unit and slide out the L-shaped top cover. Remove the two Phillips-head screws on the bottom of both sides of the unit and remove the bottom cover.

c. Make certain that no vacuum tubes are broken and that they are properly seated in their correct sockets (fig. 8 and 9).

d. Inspect the internal wiring to make certain that the lugs are securely fastened to the leads and that the leads are securely fastened to the points of contact.

e. Inspect the power cable for kinks and cracks, and make certain that the male contact plug is properly connected.

f. See that the fuse F1 (fig. 5 and 6) is installed and that it has the proper ampere rating (para 8*c*).

g. Replace the bottom cover and the L-shaped top cover. Tighten all screws.

h. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO); if modified, an MWO number will appear on the front panel near the nomenclature plate. Check to see whether the MWO number and appropriate notations concerning the modification have been anotated in this manual.

Note. The current MWO's applicable to the equipment are listed in DA Pam 310–4.

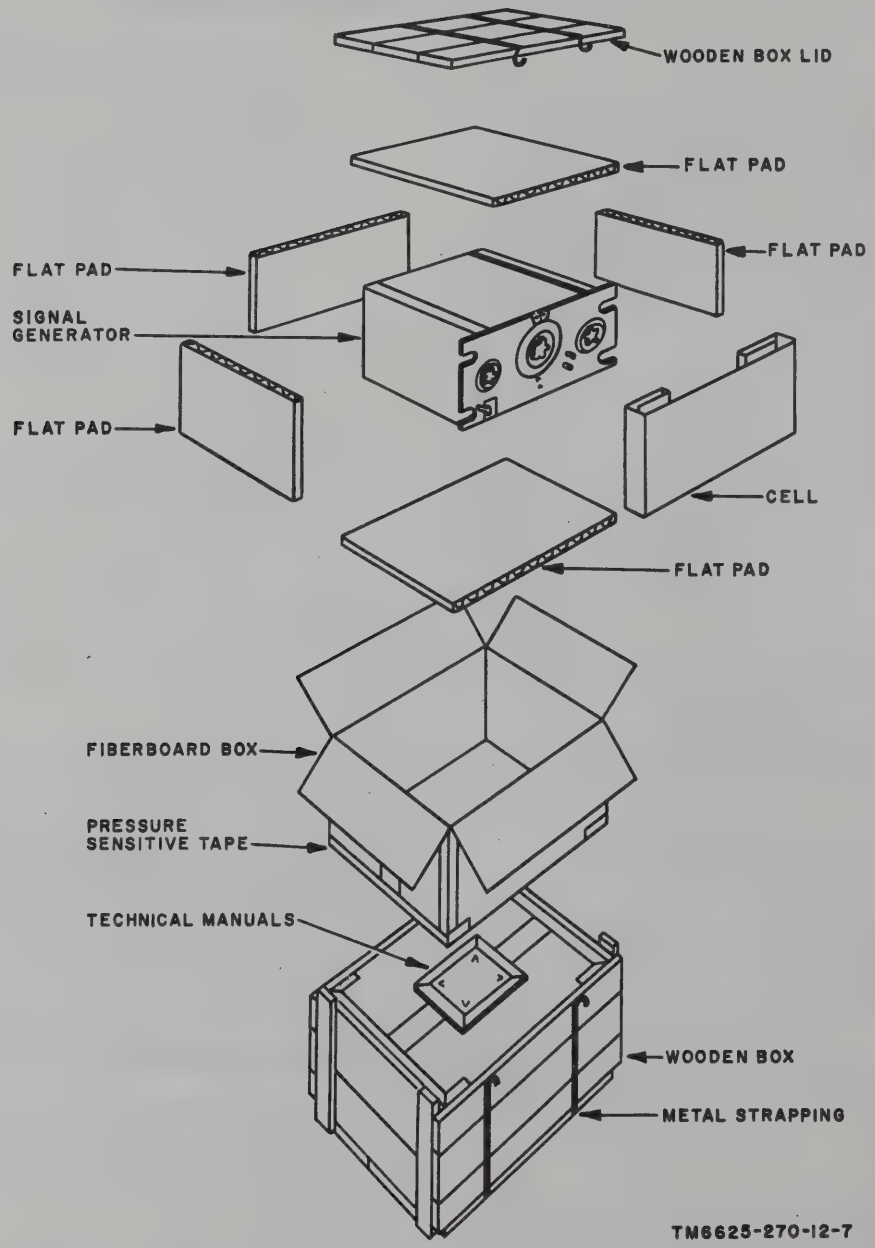


Figure 7. Typical packaging.

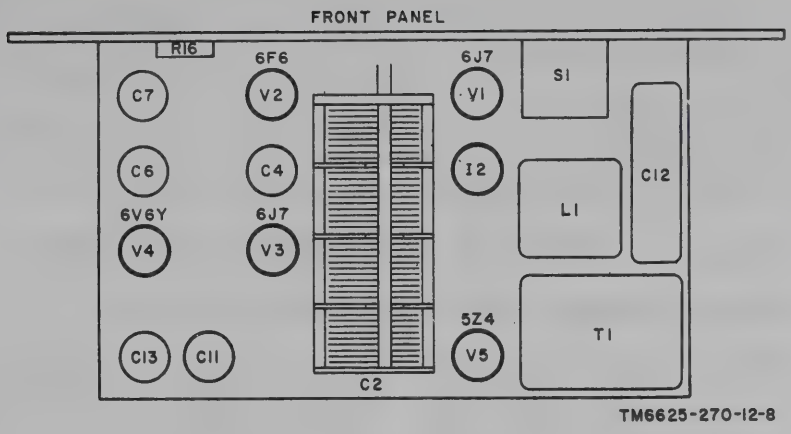


Figure 8. Signal Generator TS-312B/FSM-1, tube location diagram.

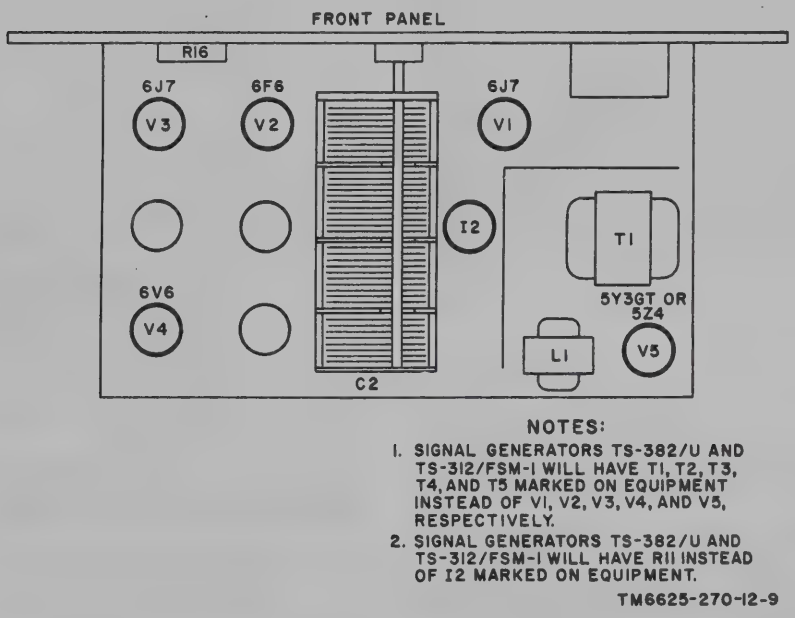


Figure 9. Audio Oscillators TS-382/U, TS-312/FSM-1, and TS-312A/FSM-1, tube location diagram.

Section II. OPERATOR'S CONTROLS

12. General

Haphazard operation of controls can cause damage to electronic equipment. For this reason it is important to know the function of every control. The actual operation of the equipment is discussed in paragraphs 14, 15, and 16.

13. Controls and Indicator

(fig. 5)

The following table lists the controls and indicator of the signal generator and indicates their functions.

Controls	Function
ON–OFF switch	At ON, connects ac power source.
Pilot lamp	Lights when ON–OFF switch is at ON.
RANGE switch	Selects band containing desired range of frequencies.
Tuning dial	Tubes to desired frequency within band selected by RANGE switch.
AMPL. control	Varies amplitude of output frequency. On some models, this control may be marked VOL (volume) control.
Output terminals.	Output is obtained from across these terminals.

Section III. OPERATION UNDER USUAL CONDITIONS

14. Preliminary Starting Procedure

a. Plug the power cable into a 115-volt alternating-current (ac) outlet. Connect a shielded lead from the output terminals of the signal generator to the input of the equipment under test. Make certain that the center conductor is attached to the upper binding post and that the shield is attached to the lower binding post.

b. The AMPL. control is not accurately calibrated. For tests requiring accuracy, a vacuum-tube voltmeter (vtvm) may be placed across the signal generator output terminals. Where small output voltages are required, the use of an attenuator between the signal generator and the equipment under test is desirable.

15. Operating Procedure (fig. 5)

a. Set the ON-OFF switch to ON and allow the equipment to warm up for 10 to 15 minutes. The pilot lamp should be lighted when the set is in operation.

b. Set the RANGE switch to the band containing the frequencies or frequency wanted. The four bands and the frequencies which they cover are as follows:

Band	Frequency range (cps)
X1	20 to 200
X10	200 to 2,000
X100	2,000 to 20,000
X1000	20,000 to 200,000

c. Turn the tuning dial so that the hairline is at the point where the dial reading multiplied by the multiplication factor on the RANGE switch gives the desired frequency.

(1) To obtain an output frequency of 350 cps, proceed as follows: Since 350 cps lies between 200 and 2,000 cps, it is in band X10. Place the RANGE switch at X10, and turn the tuning dial so that 35 is under the hairline. The signal generator is now tuned to 350 cps. As a check, note that 350 is obtained when 35 is multiplied by the 10 on the RANGE switch.

(2) To obtain an output frequency of 140,000 cps (between 20,000 and 200,000 cps), place the RANGE switch at X1000. Turn the tuning dial to 140. Again check the reading by noting that 140 multiplied by the factor of 1,000 on the RANGE switch equals 140,000 cps.

d. Use the AMPL. control for adjusting the amplitude of the output signal.

16. Stopping Procedure (fig. 5)

a. To shut down the signal generator for short periods of time, set the ON-OFF switch to OFF.

b. To shut down the signal generator completely, disconnect the power cable and all external connections.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. OPERATOR'S MAINTENANCE

17. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of Signal Generator TS-312B/FSM-1 and Audio Oscillator TS-382/U, TS-312/FSM-1, or TS-312A/FSM-1 are listed below together with a reference to the paragraphs covering the specific maintenance functions. These procedures do not require special tools or test equipment.

a. Daily preventive maintenance checks and services (para 20).

b. Weekly preventive maintenance checks and services (para 21).

c. Cleaning (para 22).

18. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 19 through 22 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services charts (para 20 and 21) outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat service able condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the charts indicate what to check, how to check, and what the normal conditions are; the *References* column lists the illustrations, paragraphs, or manuals that contain detailed repair or replacement procedures. If the defect connot be remedied by the operator, higher category maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

19. Preventive Maintenance Checks ond Services Periods

Preventive maintenance checks and services of the signal generators are required daily and weekly. Paragraphs 20 and 21 specify the items to be checked and serviced. In addition to the routine daily and weekly checks and services, the equipment should be rechecked and serviced immediately before going on a mission and as soon after completion of the mission as possible.

20. Daily Preventive Maintenance Checks and Services

Sequence No.	Item	Procedure	References
1	Signal generator	Check the signal generator for completeness and general condition.	Appx B.
2	Exterior surfaces	Clean the exterior surface of the equipment.	Para 22.
3	Connections	Inspect the output jacks and the power cable plug for breakage.	None.

Sequence No.	Item	Procedure	References
4	Knobs, controls, and switches	During operation (item 7), check knobs, controls, and switches for proper mechanical and electrical operation. Action must be positive without backlash, binding, or scraping.	None.
5	Lamp and lens	During operation, inspect the lamp for an open filament and the lens for breaks.	Fig. 5, 8, and 9.
6	Start	Set the ON–OFF switch to ON, and allow 20-minute warmup period. The pilot lamp must light.	Para 14.
7	Operation	Connect the signal generator to the equipment under test. Select the correct operating frequency and the required amplitude. An audible tone must be heard, or a visible indication must be observed due to the signal generator output.	Para 15.

21. Weekly Preventive Maintenance Checks and Services

Sequence No.	Item	Procedure	References
1	Cable	Inspect the power cable for cuts, fraying, and deterioration.	None.
2	Preservation	Inspect the front panel for bare spots, rust, and corrosion.	None.

22. Cleaning

Inspect the exterior of the signal generator. The exterior surfaces should be free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean soft cloth.

Warning: **Prolonged breathing of cleaning compound is dangerous; make certain adequate ventilation is provided. Cleaning compound is flammable; do not use near a flame. Avoid contact with the skin; wash off any that spills on your hands.**

b. Remove grease, fungus, and ground-in dirt from the cases; use a cloth dampened (not wet) with Cleaning Compound (FSN 7930–395–9542).

c. Remove dust or dirt from jacks with a brush.

d. Clean the front panel, and control knobs; use a soft, clean cloth. If dirt is difficult to remove, dampen the cloth with water; mild soap may be used for more effective cleaning.

Section II. ORGANIZATIONAL MAINTENANCE

23. Scope of Unit Repairman's Maintenance

a. This section contains instructions covering organizational maintenance of Signal Generator TS–312B/FSM–1 and Audio Oscillators TS–382/U, TS–312/FSM–1, and TS–312A/FSM–1. It includes instructions for performing preventive and periodic maintenance services and repair functions to be accomplished by the organization repairman.

b. The organizational, maintenane of Signal Generator TS–312B/FSM–1 and Audio Oscillators TS–382/U, TS–312/FSM–1, and TS–312A/FSM–1 includes:

(1) Organizational preventive maintenance (para 25, 26, and 27).

(2) Lubrication (para 28).
(3) Touchup painting (para 29).
(4) Troubleshooting (para 30).
(5) Replacement of fuses (para 31).
(6) Replacement of pilot lamp or indicator lens (para 32).
(7) Replacement of 3-watt lamp (para 33).

24. Materials Required

The materials required for organizational maintenance are indicated below.

a. Cleaning Compound (Federal stock No. 7930–395–9542).

***Warning:* Prolonged breathing of cleaning compound is dangerous; make certain adequate ventilation is provided. Cleaning compound is flammable; do not use near a flame. Avoid contact with the skin; wash off any that spills on your hands.**

b. Cleaning cloth.
c. Sandpaper.
d. Paint.

25. Organizational Preventive Maintenance

a. Organizational preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operation capability. Preventive maintenance is the responsibility of all categories concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of the signal generators at organizational maintenance are made at monthly intervals unless otherwise directed by the commanding officer.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38–750.

26. Monthly Maintenance

Perform the maintenance functions indicated in the monthly preventive maintenance checks and services chart (para 27) once each month. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment maintained in a standby (ready for immediate operation) condition must have monthly preventive maintenance checks and services. Equipment in limited storage (requires service before operation) does not require monthly preventive maintenance.

27. Monthly Preventive Maintenance Checks and Services

Sequence No.	Item	Procedure	References
1	Publications	Inspect manual for completeness and to see if it is in usable condition. Be sure all Changes to the manual are on hand.	DA Pam 310–4.
2	Modification work orders	Check to see that all URGENT MWO's have been applied and that all NORMAL MWO's have been scheduled.	DA Pam 310–4.
3	Completeness	Check the equipment for completeness and general condition.	Appx B.
4	Exterior surfaces	Clean exterior surfaces of the equipment.	Para 22.
5	Preservation	Inspect the equipment for bare spots, rust, and corrosion.	Para 29.

Sequence No.	Item	Procedure	References
6	Connections	Inspect the output jacks and power cable plug for cleanliness and breakage.	None.
7	Knobs, controls, and switches	During operation (item 15), check knobs, controls, and switches for proper mechanical operation. Action must be positive without backlash, binding, or scraping.	None.
8	Cable	Inspect the power cable for cuts, fraying, and deterioration.	None.
9	Fuses	Check operating fuses for correct value.	Para 31.
		a. Front panel: 2-amp for TS–312B/MSM–1.	Fig. 5.
		b. Front panel: 1-amp for TS–312/FSM–1 (Order No. 38785–P–53) and TS–312A/FSM–1.	Fig. 5.
		c. Under chassis: 1-amp for TS–382/U and TS–312/FSM–1.	Fig. 6.
10	Lamp and lens	During operation, check the lamp for an open filament and the lens for breaks.	Para 30.
11	Variable capacitors	Inspect variable capacitors for dirt, corrosion and deformed plates.	None.
12	Resistors and capacitors	Inspect the resistors and capacitors for cracks, blistering, or other defects.	None.
13	Tubes	Inspect tubes for proper seating.	Fig. 8 and 9.
14	Interior	Clean interior of chassis and cabinet.	None.
15	Operation	Connect the signal generator to the equipment under test. Select the correct operating frequency and the required amplitude. An audible tone must be heard, or a visual indication must be observed due to the signal generator output.	Para 15 and 30.

28. Lubrication

Signal Generator TS–312B/FSM–1 and Audio Oscillators TS–382/U, TS–312/FSM–1, and TS–312A/FSM–1 require no lubrication.

29. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding the surfaces with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TB SIG 364.

30. Troubleshooting

a. General. Troubleshooting of this equipment is based on the operational check contained in the monthly preventive maintenance checks and services chart (para 27). To troubleshoot the equipment, perform the functions listed in the chart in paragraph 27, in sequence, until an abnormal condition or result is observed. Perform the checks and corrective actions indicated in the troubleshooting chart (*b* below). If the corrective measures indicated do not result in correction of the trouble, higher category maintenance is required.

b. Troubleshooting chart.

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures.
1	Pilot lamp does not light when ON-OFF switch is set to ON.	*a.* Defective fuse F1	*a.* Check fuse F1 (para 31, and fig. 5 and 6). Check for proper seating of fuse. Check for corrosion in fuse-holder.

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures.
		b. Defective pilot lamp	*b.* Check pilot lamp (para 32 and fig. 5). Check for proper seating of pilot lamp. Check for corrosion in the pilot lamp socket.
		c. Power cable not plugged into an energized line receptacle.	*c.* Check power cable for proper seating in line receptacle.
2	No output tone or visual indication on equipment under test.	*a.* Defective fuse F1	*a.* Same as for 1*a* above.
		b. Defective 3-watt lamp RT1	*b.* Check RT1 (para 33).

31. Replacement of Fuses

a. TS–312/FSM–1 (Order No. 38785–P–53), TS–312A/FSM–1, and TS–312B/FSM–1) (fig. 5).

(1) Turn the fuseholder cap counterclockwise and pull it out; the fuse will come out with it.

(2) Remove the defective fuse from the fuseholder cap and replace it with a new one of correct ampere rating (para 7*c*).

(3) Replace the fuseholder cap in the fuseholder; push in and turn clockwise until the cap locks.

b. TS–312/FSM–1 and TS–382/U (fig. 6).

(1) Remove the two Phillips-head screws on the bottom of both sides of the set, and remove the bottom cover to expose the underside of the chassis.

(2) Fuse F1 is located at the back of and under the chassis behind tube socket T5 and next to the power cable entrance.

(3) The fuse is held on both ends by metal clips. With a small instrument, pry up on the body of the fuse; this will free one end.

(4) Pull the defective fuse out and replace it with a new one.

(5) Make certain that the metal fuse ends are held firmly by holder clips.

32. Replacement of Pilot Lamp or Indicator Lens

(fig. 5)

a. Turn the glass indicator lens counterclockwise and pull it out to expose the defective lamp.

b. Press in on the lamp and turn it counterclockwise to unlock it.

c. Pull the defective lamp out and replace it with a new one.

d. Replace the indicator lens by pressing it over the lamp and turning it clockwise.

33. Replacement of 3-Watt Lamp

(fig. 8 and 9)

a. Disconnect the power cable.

b. Loosen the two screws on the top of both sides of the unit. Remove the four Phillips-head screws at the rear of the unit and slide the L-shaped top cover out to expose the top of the chassis.

c. Locate the 3-watt lamp, RT1 (identified as I2), and unscrew it by turning it counterclockwise.

d. Remove the defective lamp and replace it with a new one from the running spares; turn it clockwise until it is firmly seated.

CHAPTER 4

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

34. Repackaging for Shipment or Limited Storage

(fig. 10)

Remove all leads, roll up the power cable, and secure the cable to the equipment with gummed tape (*a* below). The exact procedure for repackaging depends on the material available and the conditions under which the equipment is to be shipped or stored. Adapt the procedures outlined below whenever possible.

a. Material Requirements. The following materials are required for packaging the signal generator. For stock numbers of materials, consult SB 38–100.

Material	Quantity (estimated)
Waterproof wrapping paper	20 sq ft
Corrugated fiberboard	20 sq ft
Waterproof tape	8 ft
Gummed tape	12 ft
Steel strapping	10 ft
Wooden shipping box (inches dimensions: 19 by 10–5/8 by 7 inches).	

b. Packaging. Package the items of the signal generator as outlined below. Refer to figure 10.

(1) *Signal generator.* Cushion the equipment with corrugated fiberboard. Secure the cushioning with gummed tape. Place the cushioned signal generator within a wrap of waterproof paper. Secure the waterproof paper with waterproof tape.

(2) *Technical manuals.* Package each technical manual within a close-fitting bag prefabricated of waterproof paper. Seal the bag securely with waterproof tape.

(3) *Running spares.* Cushion the running spares by wrapping them with corrugated fiberboard. Secure the cushioned material with gummed tape. Place the cushioned running spares within a wrap of waterproof paper. Secure the waterproof paper with waterproof tape.

c. Packing. Pack the items of the signal generator as follows:

(1) Place the signal generator in the wooden shipping box.

(2) Place the running spares and the technical manuals on top of the equipment.

(3) Place the cover on the box and secure it with steel strapping.

(4) Mark the box as prescribed in MIL–STD–129B.

35. Authority for Demolition

The demolition procedures given in paragraph 36 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon the order of the commander.

36. Methods of Destruction

Any or all of the methods of destruction given below may be used. The time available and the tactical situation will determine the method to be used. It is preferable to demolish completely some critical part of the equipment than to partially destroy all of the unit.

***Warning:* First, disconnect the power cable.**

a. Smash. Smash the interior and exterior of the set. Use sledges, axes, hammers, crowbars, or any other heavy tools available. Smash

tubes, tube sockets, knobs, insulators, terminal boards, power cord connector, variable capacitors, and switches.

b. Cut. Cut the power cable and interior wiring. Use axes, handaxes, machetes, or similar tools. Cut all wire and cable in a number of places.

c. Burn. Burn the technical manuals first. Burn as much of the equipment as is flammable. Use gasoline, oil, flamethrowers, and similar materials. Pour gasoline on the cut cable and interior wiring and ignite it. Use a flamethrower to burn spare parts, or pour gasoline on the spares and ignite it. Use incendiary grenades to complete the destruction of the unit interior.

Warning: **Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.**

d. Explode. Use explosives to complete demolition or to cause maximum damage when time does not permit complete demolition by other means. Powder charges, fragmentation grenades, or incendiary grenades may be used.

(1) Use a fragmentation grenade to destroy the top of the chassis. Remove the chassis from the case and place it upside down on the grenade.

(2) For quick destruction of the signal generator, place an incendiary grenade on top of unit.

e. Dispose. Bury or scatter the destroyed parts, or throw them into nearby waterways. This is particularly important if a number of parts have not been completely destroyed.

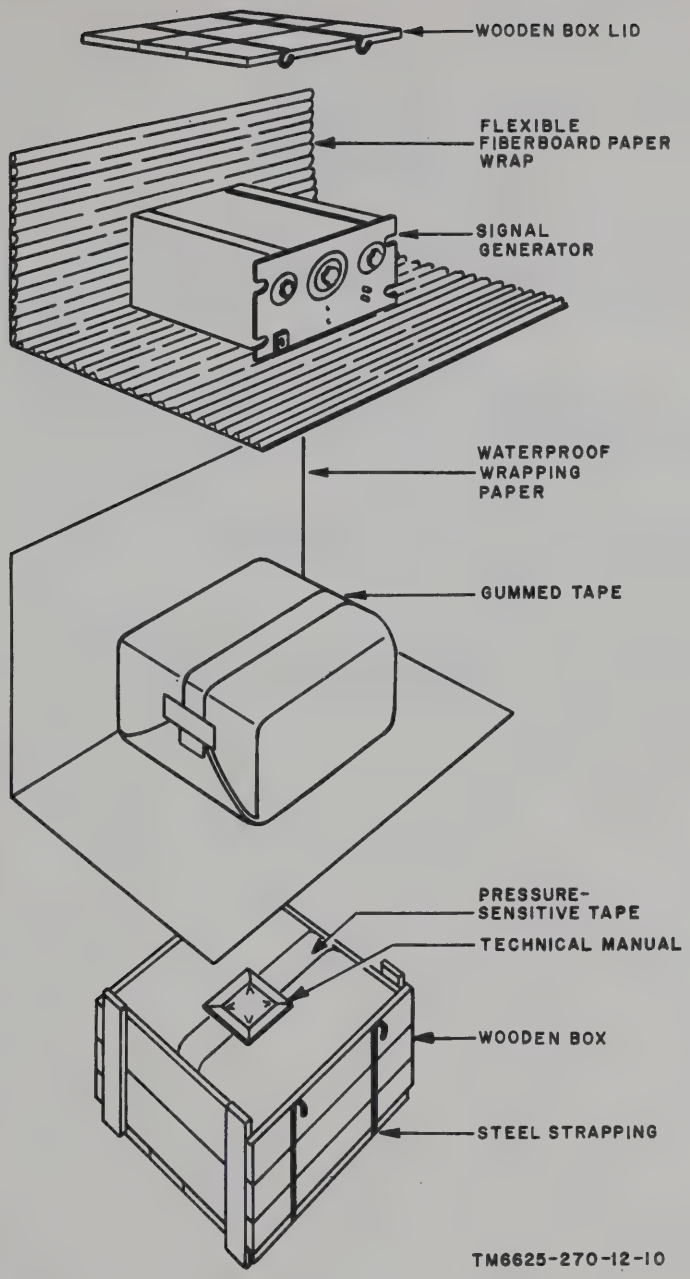


Figure 10. Repackaging.

APPENDIX A

REFERENCES

Following is a list of applicable references available to the operator and organizational repairman of Signal Generator TS–312B/FSM–1 and Audio Oscillators TS–382/U, TS–312/FSM–1, and TS–312A/FSM–1.

AR 700–58	Report of Damaged or Improper Shipment.
DA Pam 310–4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
MIL–STD–129B	Marking for Shipment and Storage.
SB 38–100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army.
TB SIG 364	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 38–750	Army Equipment Record Procedures.

APPENDIX B

BASIC ISSUE ITEMS

Section I. INTRODUCTION

B–1. General

This appendix lists items for Audio Oscillator TS–312B/FSM–1, the component items comprising it, and the items which accompany it, or are required for installation, operation, or operator's maintenance.

B–2. Explanation of Columns

An explanation of the columns in section II is given below.

a. Source, Maintenance, and Recoverability Codes, Column 1. Not used.

Note. When no code is indicated in the recoverability column, the part will be considered expendable.

b. Federal Stock Number, Column 2. The Federal stock number for the item is indicated in this column.

c. Description, Column 3. The Federal item name, a five digit manufacturer's code, and a part number, are included in this column.

d. Unit of Issue, Column 4. The unit used as a basis of issue (e.g. ea, pr, ft, yd, etc) is noted in this column.

e. Quantity Incorporated in Unit Pack, Column 5. Not used.

f. Quantity Incorporated in Unit, Column 6. The total quantity of the item used in the equipment is given in this column.

g. Quantity Authorized, Column 7. The total quantity of an item required to be on hand and necessary for the operation and maintenance of the equipment is given in this column.

h. Illustration, Column 8.

(1) *Figure number, column 8a.* The number of the illustration in which the item is shown is indicated in this column.

(2) *Item or symbol number, column 8b.* The callout number used to reference the item in the illustration appears in this column.

B–3. Federal Supply Codes

This paragraph lists the Federal supply code with the associated manufacturer's name.

Code	Manufacturer's Name
24455	General Electric Co. Lamp Division of Consumer Products Group
81349	Military Specifications
81350	Joint Army-Navy Specifications

(1) SOURCE CD (A)	(1) MAINT. CD (B)	(1) REC. CODE (C)	(2) FEDERAL STOCK NUMBER	MODEL 1	2	3	4	5	6	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC IN UNIT PACK	(6) QTY INC IN UNIT	(7) QTY AUTH	(8) ILLUSTRATIONS (A) FIGURE NUMBER	(8) ILLUSTRATIONS (B) ITEM OR SYMBOL NUMBER
			6625-192-5094							AUDIO OSCILLATOR TS-312B/FSM-1: Freq data; 20 cycles to 200 kc freq range 100 mw max output 50 ohms impedance 115 v, 50 to 1600 cycles single phase 16 in lg X 10 in w X 7 in h (This item is nonexpendable.)					1	
										TECHNICAL MANUAL TM 11-6625-935-12	ea		1	1		
										Requisition through pinpoint account number if assigned; otherwise through nearest Adjutant General facility.						
										NOTE: For technical manuals the quantity indicates the maximum number of copies authorized for packing (or issue) with the equipment. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to practical levels. Excess publications must be returned to publication supply centers through AG channels.						
			5960-188-8600							ELECTRON TUBE: 81350; 5Z4	ea		1	1	4	V5
			5960-188-8504							ELECTRON TUBE: 81350; 6F6	ea		1	1	4	V2
			5960-188-8538							ELECTRON TUBE: 81350; 6J7	ea		2	2	4	V1, V3
			5960-100-5893							ELECTRON TUBE: 81350; 6V6	ea		1	1	4	V4
			5920-280-4466							FUSE, CARTRIDGE: 81349; F02G2R00A	ea		1	1	4	F-1
			6240-155-8706							LAMP, INCANDESCENT: 24455; 47	ea		1	1	4	DS1
			6240-143-7510							LAMP, INCANDESCENT: 120 v; 3 w; 24455; 3S6/5	ea		1	1		RT-1
										NO ACCESSORIES, TOOLS OR TEST EQUIPMENT ARE TO BE ISSUED WITH THIS EQUIPMENT						
										NO BASIC ISSUE ITEMS ARE MOUNTED IN OR ON THIS EQUIPMENT						

APPENDIX C

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C–1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature for Audio Oscillator TS–312B/FSM–1. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C–2. Explanation of Format for Maintenance Allocation Chart

a. Group Number. Not used.

b. Component Assembly Nomenclature. This column lists the item names of component units, assemblies, subassemblies, and modules on which maintenance is authorized.

c. Maintenance Function. This column indicates the maintenance category at which performance of the specific maintenance function is authorized. Authorization to perform a function at any category also includes authorization to perform that function at higher categories. The codes used represent the various maintenance categories as follows:

Code	Maintenance Category
C	Operator/Crew
O	Organizational Maintenance
F	Direct Support Maintenance
H	General Support Maintenance
D	Depot Maintenance

d. Tools and Equipment. The numbers appearing in this column refer to specific tools and equipment which are identified by these numbers in section III.

e. Remarks. Self explanatory.

C–3. Explanation of Format for Tool and Test Equipment Requirements

The columns in the tool and test equipment requirements chart are as follows:

a. Tools and Equipment. The numbers in this column concide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool for the maintenance function.

b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the facility.

c. Nomenclature. This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

d. Federal Stock Number. This column lists the Federal stock number.

e. Tool Number. Not used.

MAINTENANCE ALLOCATION CHART

GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
	AUDIO OSCILLATOR TS-312B/FSM-1	C	H D	C	H D	H D	H D			H D O	D	D	1 thru 9	Exterior of component Limited to replacement of tubes, fuses, lamps and knobs

TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
		TS-312B/FSM-1 (continued)		
1	H,D	FREQUENCY METER AN/TSM-16	6625-542-1666	
2	H,D	MULTIMETER TS-352/U	6625-242-5023	
3	H,D	MULTIMETER ME-26B/U	6625-542-6407	
4	H,D	OSCILLOSCOPE OS-8/U	6625-643-1740	
5	D	TEST SET, ELECTRON TUBE TV-2/U	6625-699-0263	
6	H	TEST SET, ELECTRON TUBE TV-7D/U	6625-820-0064	
7	H,D	ANALYZER, SPECTRUM TS-723/U	6625-668-9418	
8	H,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	5180-610-8177	
9	H,D	TOQL KIT, ELECTRONIC EQUIPMENT TK-100/G	5180-605-0079	

MAAG (2)
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USARSG (5)
AFIP (5)
DPG (5)
Units org under fol TOE:
(2 copies each)
1–7
1–37
1–107
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1–137
1–307
5–600
9–217
11–6
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11–44
11–57
11–97
11–98
11–117
11–127
11–155
11–157
11–158
11–225
11–226
11–327
11–347
11–500 (KA, KD, RD, RE, RF, RK, RL, RO, TC)
11–587
11–592
11–597
17
17–100
29–1
29–11
29–15
29–16
29–17
29–21
29–25
29–26
29–27
29–35
29–36
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29–75
29–79
29–85
29–86
29–87
29–105
29–109
30–25
30–29
31–105
33–56
33–500 (HB, IA–IC, KD)
37
37–100
39–51
39–52
44–235
44–237
45–520
47
55–89
55–99
55–157
55–405
55–407
55–417
55–457
55–458
57
57–100

NG: State AG (3).

USAR: None.

For explanation of abbreviations used, see AR 320–50.

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USARHAW (5)
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USACOMZEUR (10)
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1st FA Bde (5)
52nd USASA Spec Opn Comd (5)
83rd USASA Spec Opn Comd (5)
177th UDASA Spec Opn Comd (5)
507th USASA Gp (5)
508th USASA Gp (5)
318th USASA Bn (5)
319th USASA Bn (5)
75th USASA Co (5)
182nd, 183rd, 184th,
  251st, 280th, & 281st
  USASA Op Co (5)
102nd USASA Scty Det (5)
104th USASA Scty Det (5)
401st USASA Spec Opn Det (5)
1st, 2d, 3rd, 4th 5th,
  8th, 9th, 12th, 13th, &
  14th USASA Fld Sta (5)
Svc Colleges (2)
Br Svc Sch (2) except
  USASESCS (40)
  USAADS (60)
  USAOC&S (10)
  USMA (10)
  USATC Armor (2)
USATCFLW (2)
USATC Inf (2)
USASTC (2)
WRAMC (1)
Army Pic Cen (2)
USACDCEC (10)
USAJFKCENSPWAR (5)
Instl (2) except
  Fort Hancock (4)
  Fort Gordon (10)
  Fort Huachuca (10)
  WSMR (5)
  Fort Carson (25)
  Fort Knox (12)
  Fort Devens (5)
  Fort Belvoir (5)
Army Dep (2) except
  LBAD (14)
  SAAD (30)
  TOAD (14)
  LEAD (7)
  SHAD (3)
  NAAD (5)
  SVAD (5)
  CHAD (3)
  ATAD (10)
  ANAD (5)
  UTAD (5)
  PUAD (5)
  ERAD (5)
GENDEPS (2)
Sig Sec GENDEPS (5)
Sig Dep (12)
Sig FLDMS (2)
AMS (1)
USAERDAA (2)
USAERDAW (13)
USACRREL (2)